Multi-Layer Ceramic Fuel Cells BAA

"Tape Calendering Manufacturing Process for Multi-Layer Thin-Film Solid Oxide Fuel Cells"

Performer:

Honeywell International, Inc.
Torrance, CA

Contract: DE-AC26-00NT40705

PI: Dr. Nguyen Minh

Funding: $1.4M DOE
+ $0.4M Non-DOE Share
= $1. 8M

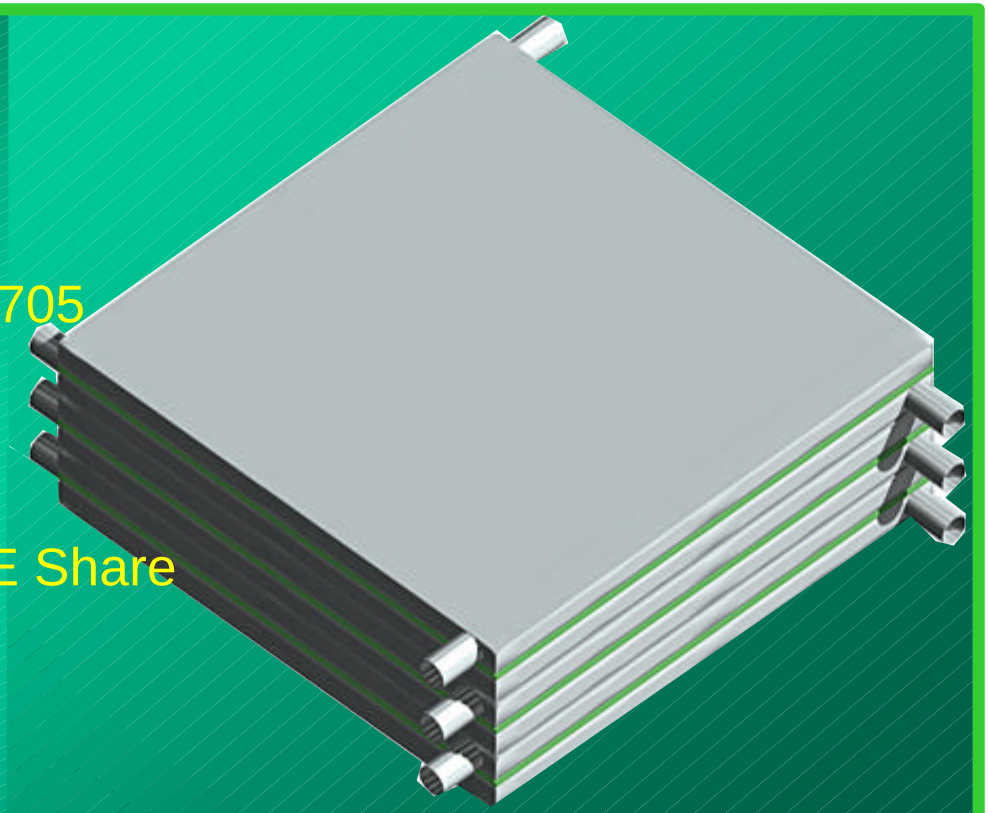


Image Courtesy of Honeywell

Honeywell Project Description

- Investigate a tape calendering process for fabricating multiple layers of cell components for a unitized solid-oxide fuel cell.
- Investigate design and fabrication of the interconnect housing and the gas flow manifolds for the unitized solid-oxide fuel cell.
- Design an optimized high-volume manufacturing process around tape calendering for unitized solid-oxide fuel cells.
- Develop destructive and non-destructive evaluation techniques to characterize & evaluate key cell and component parameters.
- Test and evaluate unitized cells under a range of conditions.
- Prepare a business plan emphasizing commercialization of the tape calendering manufacturing process.

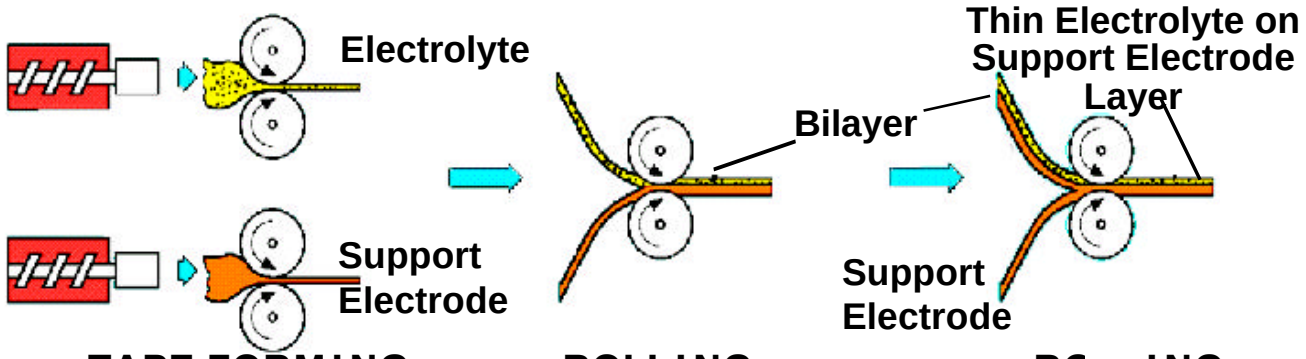
Honeywell Project Objectives & Milestones

- Establish a Cost-Effective Production Process
- Attain High-Performance for the Unitized Cell below 800 ºC
- Improve Cell Electrochemical & Thermal Cyclic Performance
- Improve Cell Flatness
- Improve Mechanical Properties

		2000	2001				2002				2003	
Phase	**Task**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**
I	Design & Mfg Assessment											
II	Mfg Cost Study											
	Cell Config & Mfg Feasibility											
	Mfg Process Development											
	Preliminary Testing											
II	Demonstration Testing											
	Business Plan											

Honeywell Significant Accomplishments

- **$146/kW estimated at 250 mW/yr production volume**
  - 5-kW stacks complete with manifold, insulation & housing
- **Tripled cell peak power density at 650 ^{O}C**
  - 0.89 W/cm² versus 0.24 W/cm² for baseline Cell
- **Validated Biaxial Flexure Strength Test Technique**
- **Anode Mechanical Strength Increased ~3X**
  - 325 Mpa versus 111 Mpa for baseline anode
- **Defined 2 Parameters from 7 as Key to Cell Flatness**
- **Manufacturing Cost Study Completed**



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